# Ideas with
# IMPACT

# Code and Go First!

# CODE AND GO FIRST!

Disseminator: Daniella Parra
Aventura Waterways K-8 Center
School Mail Code:

For more information concerning Ideas with IMPACT opportunities including
Adapter and Disseminator grants, please contact:

Audrey Onyeike, Program Director

Ideas with IMPACT

The Education Fund

305-558-4544, EXT 113

Email: audrey@educationfund.org

# Table of Contents

# Goals and Objectives

## STEAM – Science, Technology, Engineering, Art, Math

As an educator, I am aware of the importance of STEM or STEAM programs. As a parent, I want my own child to take part in STEAM activities. However, when my school recently decided to become a designated STEAM school, I found myself beyond stressed. Teaching the general curriculum like math and science is second nature to those of us that have been doing it for a while – but new ideas like teaching elementary students technology, engineering, and computer science can have us feeling a bit overwhelmed and insecure. Many of my coworkers (myself included) do not have much experience with technology in the classroom beyond researching online or using Microsoft Office apps and so the idea of it may seem daunting. The goal of this project is to give teachers the confidence to include more technology, engineering, and computer science into their lessons with the use of the Code and Go Robot Mouse. At a time when schools are focusing on enhancing STEAM, this fun robot helps kids learn to program as they build key skills that include critical thinking, problem solving, sequencing, and programming fundamentals.

## Knowledge & Experience – Be Confident, You Already Have it!

According to a research report conducted by Google, sixty-three percent of K-12 principals and 74% of superintendents who do not have Computer Science in their school or district say a reason they do not offer it is the lack of teachers available at their school with the necessary skills to teach it. Additionally, at least half of principals and superintendents note that they must devote most of their time to other courses that are related to testing requirements (Google Inc & Gallup Inc, 2016). It was only through my interactions with the Code and Go Robot Mouse that I realized "Coding" is not so scary! If we understand how to follow rules and directions, then we already have the basic

knowledge of how a code works. This project focuses on those simple rudimentary principles of coding (move forward, backward, left, right), and allows you to build upon that to navigate the Mouse Robot to your desired destination. The maze itself can be built in many ways with the use of flat square blocks that are linked together as desired. Teachers may also create their own mazes with the use of butcher paper by drawing similar blocks into the desired pattern - making it a very highly adaptable project for classroom use with students as early as Kindergarten all the way to High School. It also allows for easy integration into all subjects.

## Student Engagement and Teamwork

Students LOVE technology – it's a proven fact! Just look around and you will have a hard time finding a child that does not have a phone or tablet glued to their hands and eyes the minute they leave school. But while most technology has isolated students, the Robot Mouse has the students work through the Engineering Design Process to learn the value of rethinking and support multiple solutions together as a TEAM. The students learn to communicate with each other and to work together to accomplish their goal. By utilizing the Code and Go Mouse Robot, the students are excited because well, it's a "ROBOT!" and because it's a hands-on interactive activity. Depending on how you want to use the project, students can build a maze to match a printed task card or they can create one from scratch. The students can solve the maze and write out the code or they can be given a set of code to follow and identify their final destination on the maze. The possibilities of how to use this project are endless and so once the students master how to use the Code and Go Mouse it still doesn't get old. There is always a fresh new way to challenge and engage the students with it.

# Florida Standards

## Science Standards

**SC.2.N.1.1:** Raise questions about the natural world, investigate them in teams through free exploration and systematic observations, and generate appropriate explanations based on those explorations.

**SC.2.N.1.2:** Compare the observations made by different groups using the same tools.

## Computer Science Standards

**SC.K2.CS-CP.2.1:** Define a computer program as a set of commands created by people to do something

**SC.35.CS-CP.2.2:** Create, test, and modify a program in a graphical environment (e.g., block-based visual programming language), individually and collaboratively.

## Engineering and Technology Standards

**CTE-TECED.68.ENTECH.11.04:** Utilize the design process involving a set of steps, which can be performed in different sequences and repeated as needed.

**CTE-TECED.68.ROBTEC.05.03:** Create a flow chart that visually describes a basic robotic task.

# Course Outline / Overview

The Code and Go Robot Mouse set allows students to practice STEAM skills while working on classroom subject matter. The set comes with 10 double-sided activity cards in which the students build the maze and then create the code to solve the maze. Once students become more skilled at using the sets, you can give them blank forms so they can engineer their own maze and then create a code to solve it. By doing so, the students work through the Engineering Design Process to learn the value of rethinking (debugging) and support multiple solutions. The students also learn to communicate with each other and to work together to accomplish their goal.

I have two separate 2nd grade groups that meet with me each day for math, social studies, and science. They work with the Code and Go Mouse set at least once a week in centers during differentiated instruction (DI). With the use of teacher-made boards and the Code and Go Math set, this project can be easily adapted to make it harder or easier, based on the needs and abilities of the student. Teachers are able to determine the duration of the activity based on the degree of difficulty they want the students to work with.

This project has benefited my students in many social behavioral ways as well. First, their behavior has had a dramatic improvement as they lose the privilege of being a team leader or working in a group with the Robot Mouse if they are misbehaving or breaking rules in class. Secondly, it has taught them to work together in teams and to communicate with each other in a way that is productive. Lastly, it has taught the students to think things through and to not rush to an answer. This last lesson has lasting impacts on the way they approach all subject matter tests, quizzes, projects and classwork.

# Sample Lesson Plan

## Objectives

- Students will become familiar with the Robot Mouse and be able to input coding commands to help their Robot Mouse navigate through a maze.

- Students will be able to create a flow chart with step by step code instructions.

## Materials

- Robot Mouse (requires 3 AAA batteries)

- Maze components or butcher paper to draw maze on

- Flow Chart worksheet

- 30 coding cards

- 10 double-sided task cards

- Pencil and crayons

## Classroom Setting

- Students should be set up in small groups of 3 to 5 students.

- Each group must have enough table top space to build a maze area for the Robot Mouse to run through.

- This activity may be used as a center during differentiated instruction or as an activity center for students who complete their classwork early.

## Prior Knowledge

Students should be able to follow multi-step directions. Students should be able to work respectfully with others (this includes communicating as an active listener).

# Before the Lesson

During recess or free time, teacher may have the students participate in different activities that focus on following directions and sequencing, correlating its relationship to "coding" which are the basic step by step instructions to get a computer to function.

- Simon says

- Connect the dot worksheets

- Red Light, Green Light

Teacher should show the Robot Mouse and identify the different buttons, describing their functions.

- Provide a visual aid that identifies each button on the Robot Mouse for students to keep and use as needed

Teacher may show videos on Smart Board of how the Code and Go Robot Mouse functions.

- How to Use Your Code and Go Robot Mouse Activity Set:

  https://www.youtube.com/watch?v=U4ktPBNNw60

- Code and Go Robot Mouse Activity Set: In the Classroom:

  https://www.youtube.com/watch?v=bRfTDoZiz-k

Teacher may show videos on Smart Board of Students using the Code and Go Robot Mouse Activity Set.

- Code and Go Programmable Robot Mouse: https://www.youtube.com/watch?v=vmNf7X5Z6SY

- Code and Go Robot Mouse Activity Set: https://www.youtube.com/watch?v=ST28i4OWdEo

Teacher will review Engineering Process and discuss its importance in real-life situations, correlating its use in the Code and Go Robot Mouse activity.

Each small group of students should be given a set of materials.

- Each group will be given an opportunity to become familiar with the Robot Mouse.

- Each group will be given a different task card.

Teacher will walk around the room to observe student groups and assist as needed. Teacher will make sure:

- Students use the coding cards to help visualize each step that the mouse needs to do to reach its desired destination.

- Students will then "code" the mouse with the steps they have all decided as a group are needed.
  - If the steps work and the mouse arrives to the desired destination, students may take turns to confirm that the code works.
  - If the mouse does NOT arrive to the desired destination, students are to collaborate and work together to find where the error has occurred. Students will "debug" the code and either remove or add steps as needed to their code. Then try the new program on the Robot Mouse.

- Students will work together to create a flow chart to show the steps that were finally used to complete the task.

- Groups that finish early may be asked to come up with an alternative code to get the Robot Mouse to the same destination.

- Groups may also be given another task card with an increased level of difficulty.

## Assessments

- Observations of student work and collaboration.

- Work samples of completed "coding" Flow Charts.

# Sample Forms

## Robot Mouse Visual Aid

This Visual Aid was found on Amazon.com when I was first researching the set. A similar document is provided in the Code and Go Robot Mouse set. Copies can be made and laminated so that multiple students can look at it as needed when coding.

I obtained this poster via The Works Museum website, but there are many other free poster designs available online with the same information.
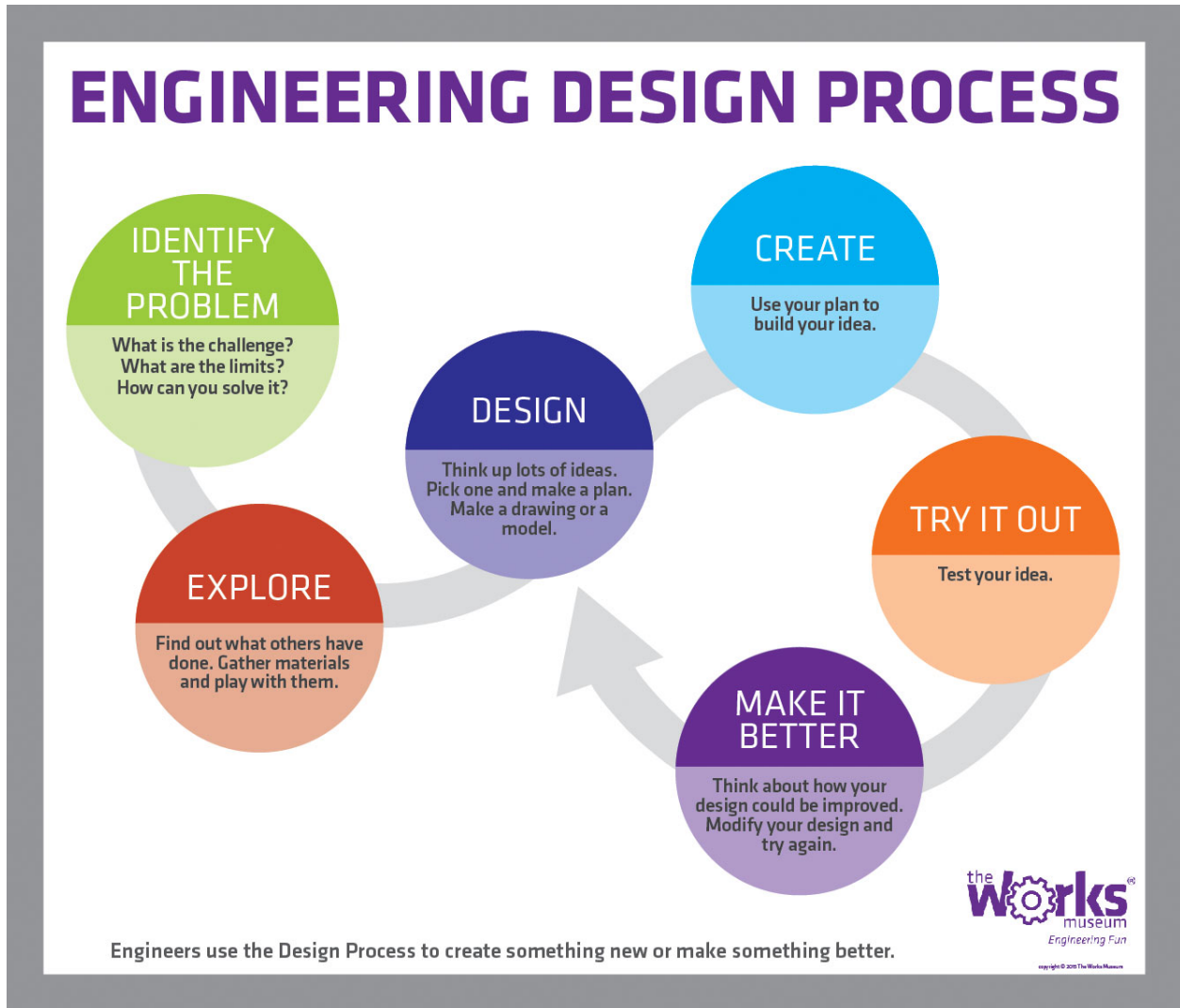
# Student Maze Design Worksheet

The set includes 10 double-sided task cards. Once the student's master those, they can begin to create their own maze or the teacher can build a maze and then have the students illustrate the design using the form below.

Name: _____ Date: _____

## MY MAZE DESIGN

Color the tiles for the maze LIGHT GREEN.
Color any lines that will have a wall PURPLE.
Draw an ORANGE rectangle where there will be a tunnel(s).
Write START in RED on the tile where the mouse should begin.
Draw a YELLOW triangle on the tile where the mouse should stop.

A completed form should look something like this…

Name: _____ Date: _____

## MY MAZE DESIGN

START

Color the tiles for the maze LIGHT GREEN.
Color any lines that will have a wall PURPLE.
Draw an ORANGE rectangle where there will be a tunnel(s).
Write START in RED on the tile where the mouse should begin.
Draw a YELLOW triangle on the tile where the mouse should stop.

## Student Coding Flow Chart - 1

As students work together to create a code to help navigate the Robot Mouse, it is helpful to have a form for the students to write on. Below is the form that I use. It provides spaces for the students to place the coding cards on, and then they can write out the finalized code. This form can also be given with the Student Maze Design Worksheet shown on the previous page.



A completed form should look something like this...

## Student Coding Flow Chart - 2

This form is a combination of the two previous pages – it provides an area for the maze to be designed as well as for the code to be written. This can be used with students once they have become more familiar with the maze design and coding process and are able to do both.

**Name:** _____  **Date:** _____

**MAZE DESIGN & CODING FLOW CHART**

Color the tiles for the maze **LIGHT GREEN**.

Color any lines that will have a wall **PURPLE**.

Draw an **ORANGE** rectangle where there will be a tunnel(s).

Write START in **RED** on the tile where the mouse should begin.

Draw a **YELLOW** triangle on the tile where the mouse should stop.

Use the following codes to program your Robot Mouse from START to △ FINISH:

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

| 8 | 9 | 10 | 11 | 12 | 13 |

| 14 | 15 | 16 | 17 | 18 | 19 | 20 |

When you are done planning your code, TEST it out by inputting it into the Robot Mouse and pressing the GREEN button. If the Robot Mouse does not end up where you wanted him, press the YELLOW button to clear the codes from the Robot Mouse, and TRY AGAIN! ☺

# Adaptability

The best part of the Code and Go Robot Mouse is how highly adaptable it is. With a bit of creativity, it can be adapted to any lesson! It can also be simplified for students as young as 5 years old and made to be more challenging for students in middle to high school. The following are a few ideas…

## Primary Ideas

- Simple mazes can be made that do not require any turns.

- Using the Learning Resources Code and Go Math mat (sold separately), teacher can code the Robot Mouse to go to different numbers, shapes, or colors and then have students identify the number, shape or color.

- Teacher can use post-it notes to stick on to the maze blocks with alphabet letters printed and then teacher can code the Robot Mouse to go to a specific letter. Student will then identify the letter the Robot Mouse has landed on, make it's correlating sound, and/or give a word that begins with that letter.

## Math Ideas - 2nd Grade and Up

- Using the Learning Resources Code and Go Math mat (sold separately), teacher can have the students code the Robot Mouse to go to different numbers, shapes, or colors.

- Teacher can use post-it notes to stick on to the maze blocks with fractions, 2-digit, or 3-digit numbers. Student will then code the Robot Mouse to land on the answer to a math word problem.

- Label the left side and the top of the maze with numbers and letters to create a grid. Student will code the Robot Mouse to get to specific grid coordinates.

## Music or Art Class Ideas

- Teacher can create QR codes of websites with paintings or music that you want students to see/hear and describe or identify. The QR codes would be taped to the maze and students would be given a code to input. Once the Robot Mouse arrives to its destination, student would use a cell phone or tablet to scan the code. For example, each QR code could be for a different instrument. Student would scan the QR code and then have to tell the teacher what instrument makes the sound that is heard.

# Internet Resource List

**Inspiration Laboratories**: https://inspirationlaboratories.com/program-a-robot-mouse-coding-for-kids/

**La Clase de Miren:** http://laclasedemiren.blogspot.com/2016/01/el-monstruo-de-colores-aprendemos-las.html

**Math Four:** http://mathfour.com/logic/bee-bot-floor-robot-teaching-basic-programming#_a5y_p=2754961

**Pinterest**: https://www.pinterest.com/

**Teacher Pay Teachers:** https://www.teacherspayteachers.com/

**Tech Age Kids**: https://www.techagekids.com/2016/11/code-go-robot-mouse-activity-set-for.html

**Van Gogh 2015**: http://vangogh2015.blogspot.com/2015/06/robotica-y-qr-en-infantil-para.html?spref=pi

**YouTube:** https://www.youtube.com/results?search_query=code+and+go+robot+mouse

# Reference List

Google Inc. & Gallup Inc. (2016). *Trends in the State of Computer Science in U.S. K-12 Schools*.

Retrieved July 17, 2019, from http://goo.gl/j291E0

Hand2Mind (2019). *STEM Coding Robot Mouse Classroom Set*. Retrieved July 17, 2019, from

https://www.amazon.com/STEM-Coding-Robot-Mouse-

Classroom/dp/1634060709/ref=sr_1_17?keywords=robot+mouse&qid=1563560362&s=gateway&sr

=8-17

Let's Start Coding. (2018). *What is Coding?* Retrieved July 17, 2019, from

https://www.letsstartcoding.com/what-is-coding

The Works Museum (2019). *Engineering Design Process*. Retrieved July 17, 2019, from

https://theworks.org/educators-and-groups/elementary-engineering-resources/engineering-design-

process/